



# EAGE and Ground Software

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# Requirements From MRD-GSW



- Shall Provide Command and Telemetry System for All Phases of FAME
- Shall Provide Command, Control, and Telemetry System for MOC and SOC
- Shall Be Compatible With BP Ground System Architecture
- Shall Control the FAME Hardware Paths (Ex. Antenna(s)) at BP
- Shall Provide Control of the Ground System Configurations Via an Extendible Script Language
- Shall Support Telemetry Acquisition and Processing of the FAME CCSDS Data Stream at the FAME Data Rates
- Shall Forward Science Data Packets and Instrument SOH Packets to the SOC in Real-Time - **TBR**
- Shall Support Monitoring of FAME Including System Status Analysis, Limit Checking, Out of Limits Reporting and Trending Analysis
- Shall Support Telemetry Archive and Playback for Both Science Data and SOH Data
- Shall Support Command Uplink and Verification
- Shall Support Three Command Modes: Real-Time, Ground Preplanned and Onboard Scheduling Based on Uplinked Command Loads
- Shall Support Verification of Command Execution, Analysis of Results, Investigation of Anomalies, and Response to Off-Nominal Situations
- Shall Support Initiation of Safing Measures Whenever It Is Determined That a Critical Event Jeopardizes the Mission
- Shall Support Calculation of S/C Velocity, Range and Range Rate to 1cm/sec



# Requirements From MRD-EAGE



- **Protect Flight Hardware During Test**
- **Provide CCSDS Uplink to Spacecraft**
- **Accept Downlink to Spacecraft**
- **Provide 30+/-6 VDC Power to Spacecraft for System Level Testing and Pre-Launch Activities**
- **Simulate/Provide 600W at 28 VDC Solar Array/Battery Power**
- **Provide Spacecraft Critical Bus/Component Protection From EAGE Overvoltage and/or Overcurrent Anomalies**



# EAGE/GSW Requirements Testing



- **All MRD Level Requirements Will Be Validated Using “TEST” Method**
- **Derived Requirements for GSW Are in the Software Requirement Spec (NCST-SRS-FM002)**



# EAGE Systems



- **FSC Test Bed (FTB) in A59**
- **Software Only Test Bed (SOTB) in T970 (No FEP)**
- **Software Only Test Bed (SOTB) in Melbourne Fl. (No FEP)**
- **Software Test Bed (STB) in T970**
- **EAGE in A59**
- **ELSE**



## C&T Workstation Running Solaris & OSComet





The diagram illustrates the Spacecraft Hardware-in-the-Loop (HIL) Test Environment. It shows the interconnections between various hardware components and a central processing unit.

**Central Processing Unit (FEP VME):** The core of the system, containing the following modules:

- Attenuator, LNA, Downconverter
- Receiver/Viterbi
- Bit Synchronizer
- Attenuator
- Transmitter
- Ordnance, Trim Tab/Area Sims
- Solar Array Sim (HP E4350B)
- Bus Protection (SEI BPU)
- Battery Sim (Kepco 36-12)
- Bus Protection (SEI BPU)

**External Hardware and Connections:**

- Sun Simulator:** Provides input to the Attenuator, LNA, Downconverter.
- Antenna Hat:** Connected to the Receiver/Viterbi and Bit Synchronizer.
- Star Field Simulator:** Provides input to the Ordnance, Trim Tab/Area Sims.
- C&T Test I/F:** Connected to the Ordnance, Trim Tab/Area Sims.
- Breakout Boxes (BOBs):** Two boxes that manage power distribution. One handles **Bus Power** and the other handles **Solar Array Power**, both originating from the FEP VME.
- Workstation:** A computer system connected to the FEP VME via an **Ethernet** connection.
- TLM CLK & DATA:** A communication link between the FEP VME and the external hardware.

011030FAME\_PDR\_SC\_Bus\_GSW&amp;EAGE.7



# GSW Status

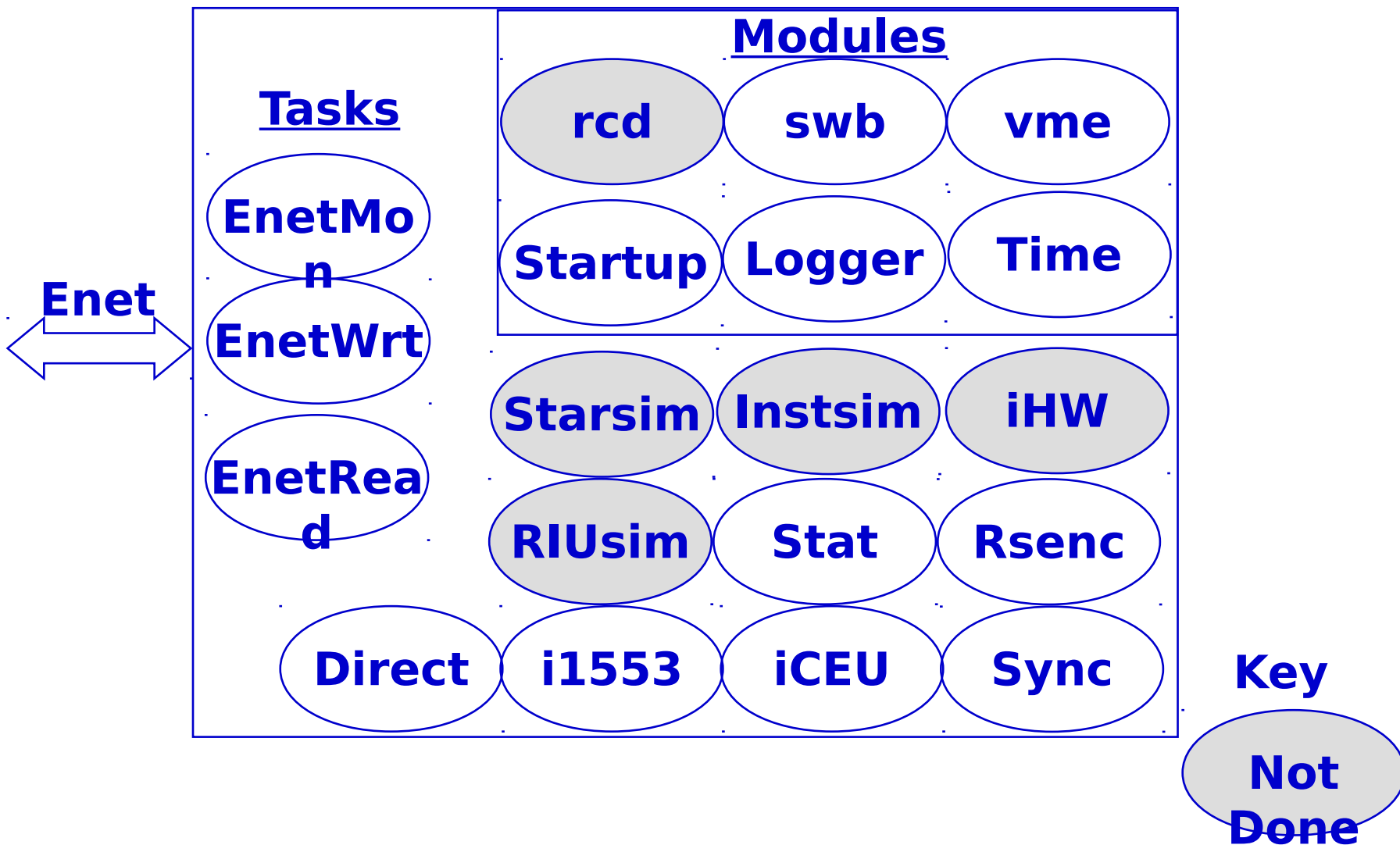


- **Command and Telemetry Works With Flight Code via Enet Interface**
- **Oracle Flight SW Database (From ICM) Converted to OSComet C&T Databases**
- **Using Latest NRL's OSComet From BP, Working Well**
- **FEP Software/Hardware Is Working (See the Next Slide):**
  - **CEU Card Validated**
  - **Frame Sync Card and Time Assignment Tested**
  - **SBS1553 Card Working**
  - **Enet Interface and Most Utility Code Working**
- **FEP Testing With FSC 1553 Bread Board Is Working With a Simple Schedule**





# FEP Design/Status





# FEP LOC



<b>Task/Module</b>	<b>Description</b>	<b>Status</b>	<b>LOC (20011018)</b>
<b>Includes</b>	<b>FEP Shared Include Files</b>	<b>90% Complete</b>	<b>1237</b>
<b>ceu</b>	<b>Cmd Encoder Task</b>	<b>Complete</b>	<b>574</b>
<b>server</b>	<b>Ethernet Tasks</b>	<b>Complete</b>	<b>345</b>
<b>VME Direct</b>	<b>VME Direct Access Task</b>	<b>Complete</b>	<b>205</b>
<b>1553</b>	<b>1553 Interface</b>	<b>95% Complete</b>	<b>4951</b>
<b>Logging</b>	<b>Logging Module</b>	<b>Complete</b>	<b>365</b>
<b>RSENC</b>	<b>RS Encoder Task</b>	<b>Complete</b>	<b>829</b>
<b>Startup</b>	<b>Startup Routine</b>	<b>Complete</b>	<b>133</b>
<b>Status</b>	<b>Status Task</b>	<b>Complete</b>	<b>370</b>
<b>Sync</b>	<b>RS Decoder (Frame Sync)</b>	<b>Complete</b>	<b>3280</b>
<b>TimeCode</b>	<b>Time Card Module</b>	<b>Complete</b>	<b>572</b>
<b>Util</b>	<b>Util, Enet, VME, SWB Code</b>	<b>Complete</b>	<b>2936</b>
<b>Total</b>			<b>15797</b>



# C&T LOC



Task/Module	Description	Status	LOC (20011026)
Includes	Inluce files	80% complete	3565
tlmasi	Application Specific Input	70% complete	5849
tlmprc	TLM procesing of frames	70% complete	4320
cmdcse	Formatting Commands	80% complete	8948
cmdaso	Output of Commands	80% complete	1522
db	Database	40% complete	9243
gmd_utils	Ground Utilites	60% complete	7032
gsec	Ground Station Control	100% complete	5952
dbgen	Database Tools	90% complete	7576
libcomm	BP Common library	100% complete	5045
lpc_user	LPC User Functions	80% complete	2489
memxltr	Memory Translator	100% complete	965
objxltr	Object translator	100% complete	37969
rptgen	Report Generator	100% complete	3144
pktgen	Creates Displays	100% complete	3173
scl	SCL code	95% complete	1974
toolbox	Test menu environment	100% complete	3501
utils	Utility Library	50% complete	297
TOTAL			112564



# Issues



- **Simulation fidelity - ex. Attitude Simulations and Mission Data**
  - **Attitude Simulation Will Run on the FEP - Design Issues**
- **Data Processing of Instrument Data for SOC at USNO Is TBD**
- **Avtec Frame Sync Card Up to a 31us Time Assignment Error**
- **Time Assignment Error Budget - How Much of the 1 ms Do We Get?**
- **Design Issues of Using BP FEP vs. EAGE FEP for Operation**



# Procurement Status



- **All Items (Except for Two VME Cards) Needed for FSC Box-Level Testing Are Available**
  - **These Two Cards Will Be Available After PDR - No Schedule Issue**
- **There Are No Long Lead Items for the EAGE**
- **Spread Sheet of the EAGE Items Are in the Backup Slides**



# Top Level Schedule



- **FAME PDR** **Oct 2001**
- **EAGE Peer Review** **Sep 2001 Complete**
- **Initial FEP Complete** **Oct 2001**
- **FEP Supports FSC Board Level Testing** **Oct 2001 Started**
- **FEP Supports FSC Box Level Testing** **Nov 2001**
- **Space/Ground ICD Available** **Oct 2001 On Web Site**
- **EAGE System Demonstration (ATP)** **Dec 2001**
- **FAME CDR** **Aug 2002**
- **EAGE System Available for Test** **Jun 2002**



# Backup



# Staffing



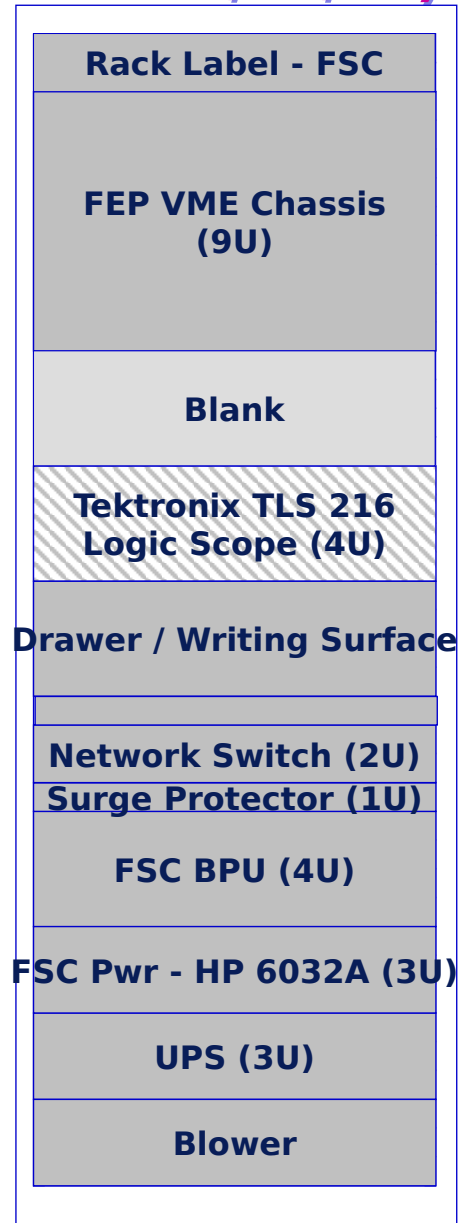
- **Eric Karlin - Full Time**
  - **GSW Development Environment, Requirements, Space/Ground ICD, CM Plan, C&T Design/Develop, C&T Databases, etc.**
- **Jeff Johnson - Full Time**
  - **Requirements, FEP Design/Development, IV&V Contact, System Administration**
- **Jeff Cleveland - When Available**
  - **Lead I&T Starting in 2002 - After WindSat**
- **Paul Jaffe**
  - **Lead Hardware**
- **TBD - Apr. 2002 thru Oct. 2003**
  - **Software and Testing**





# FAME FTB Rack

(Rev A 2001/08/13)



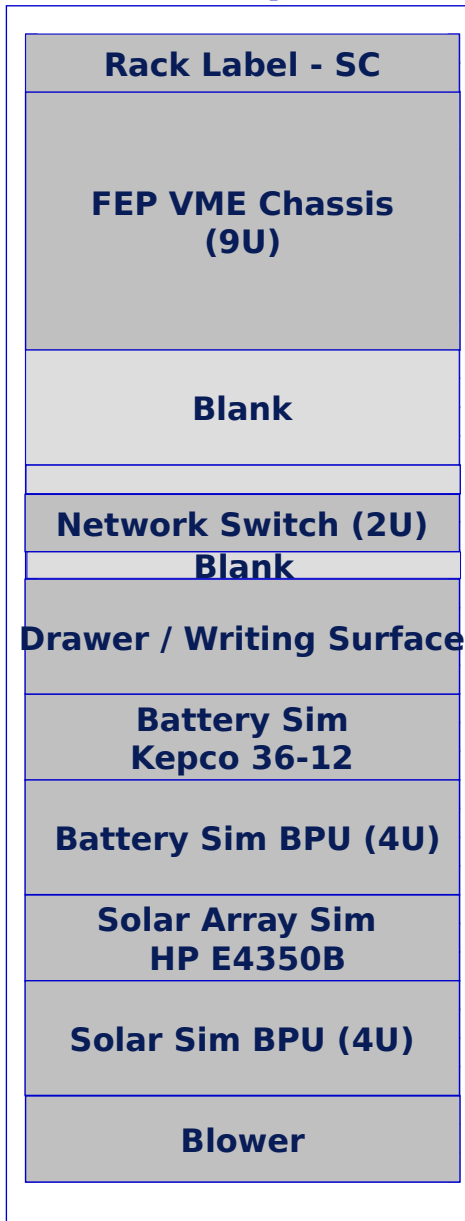
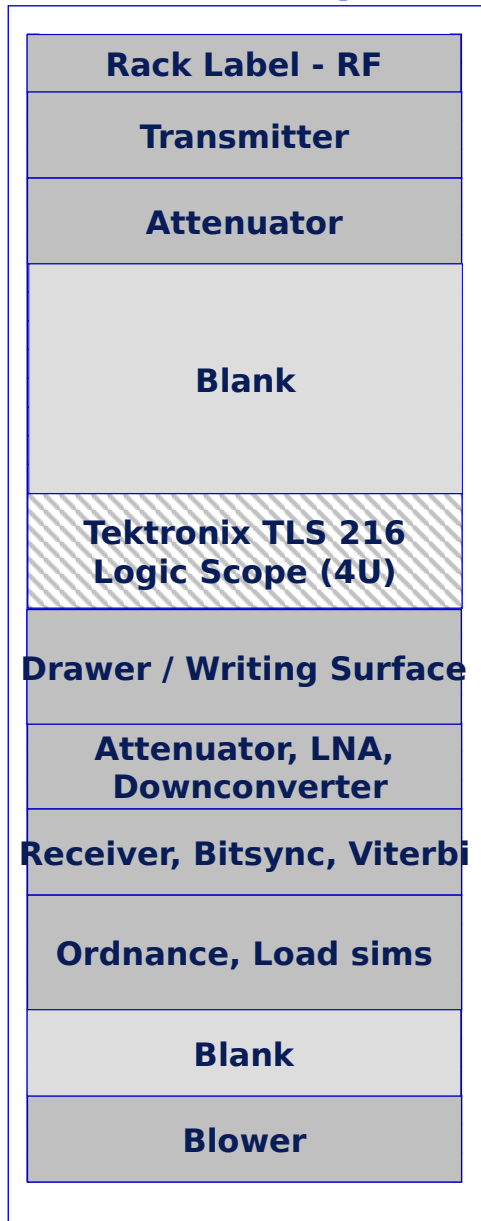
**Note: 1U = 1.75" = 44.45mm**

**Additional Equipment:  
Sun Workstation,  
Monitor, GPIB/Ethernet  
Converter**



# FAME EAGE Racks

(Rev B 2001/08/13)



**Note: 1U=1.75"=44.45 mm**

**Additional equipment:**

**Sun Workstation,  
monitor, GPIB/Enet**

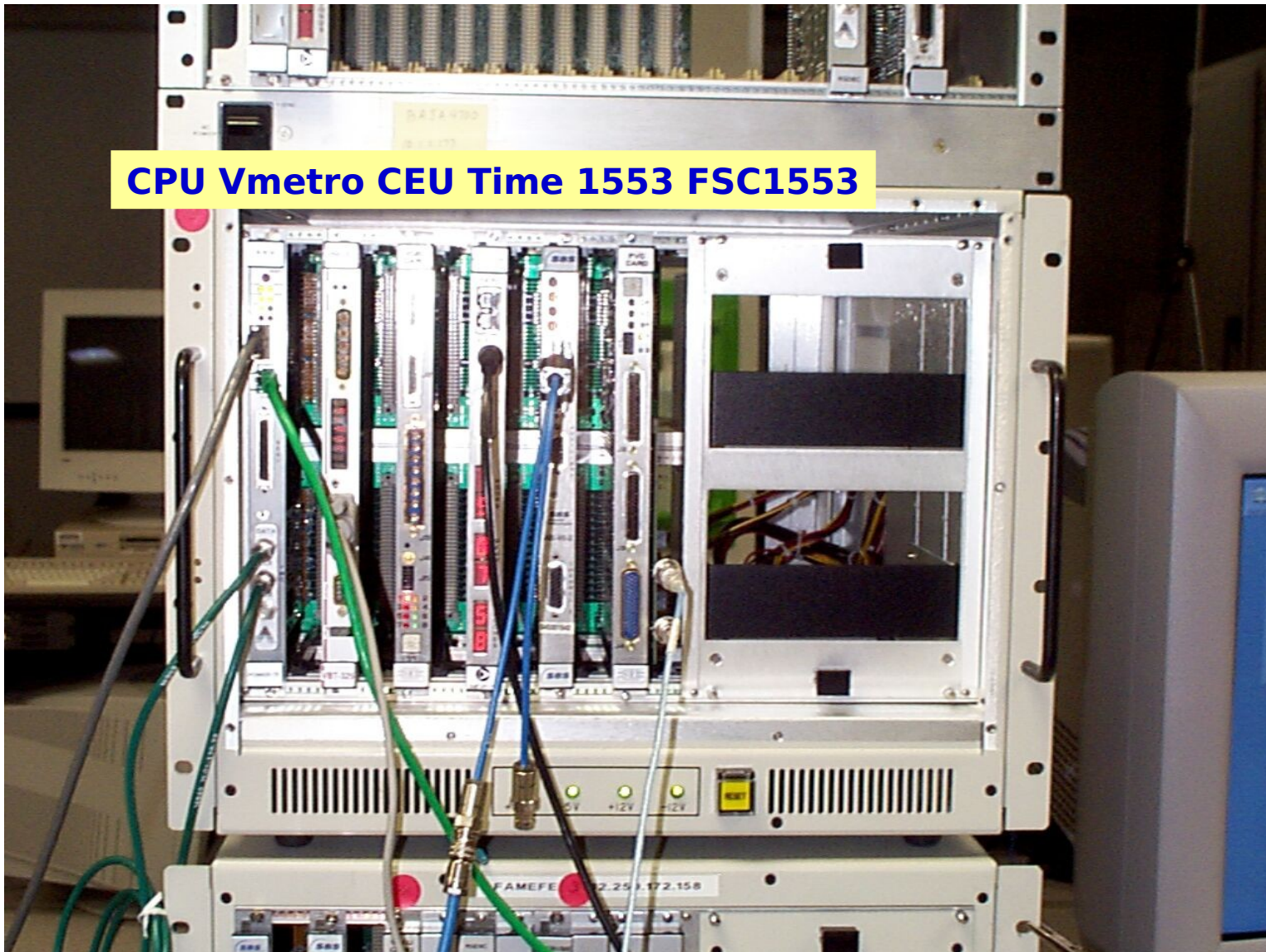


# FEP

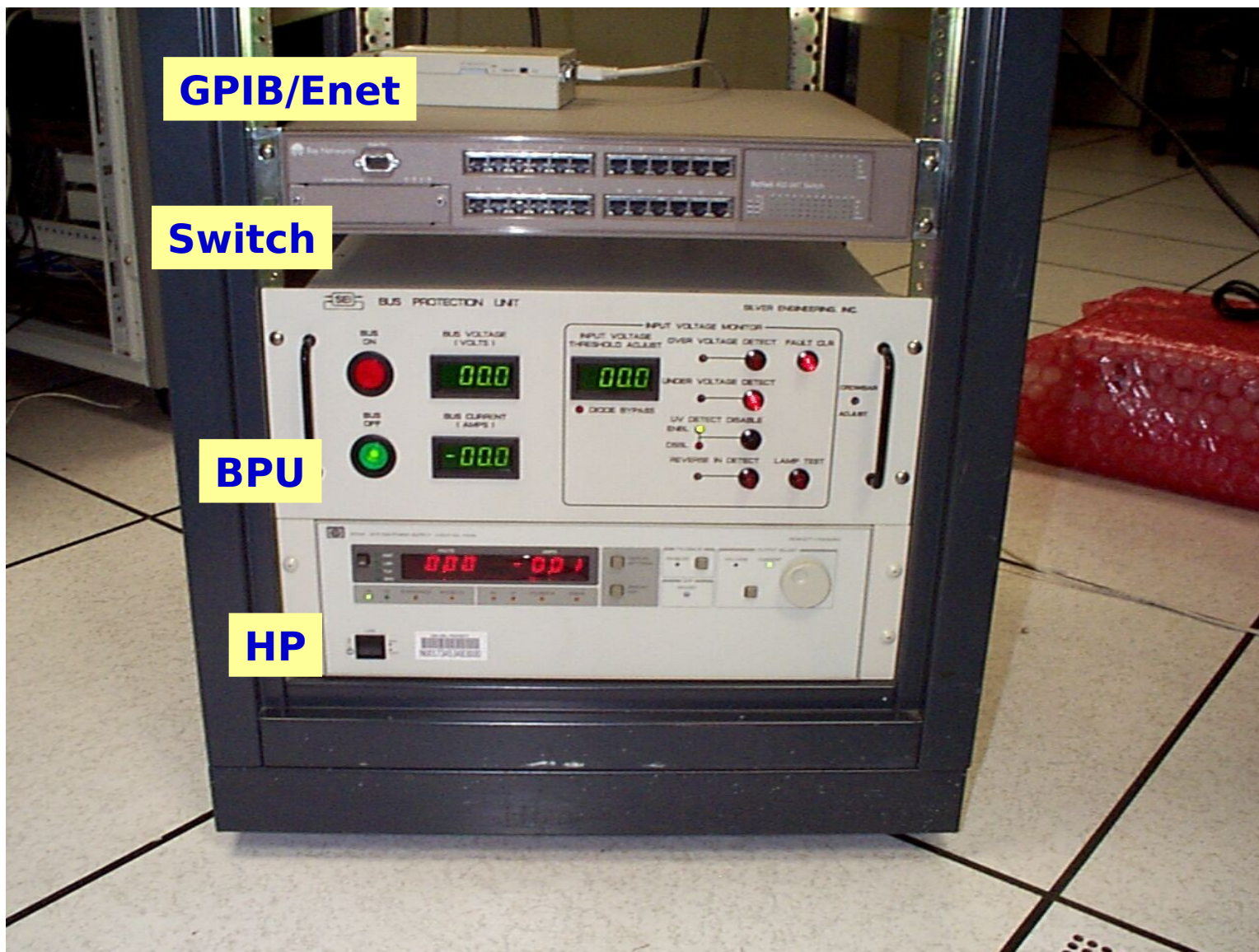
## (With FSC 1553 Bread Board)



**CPU Vmetro CEU Time 1553 FSC1553**









# Design Requirements/Approach



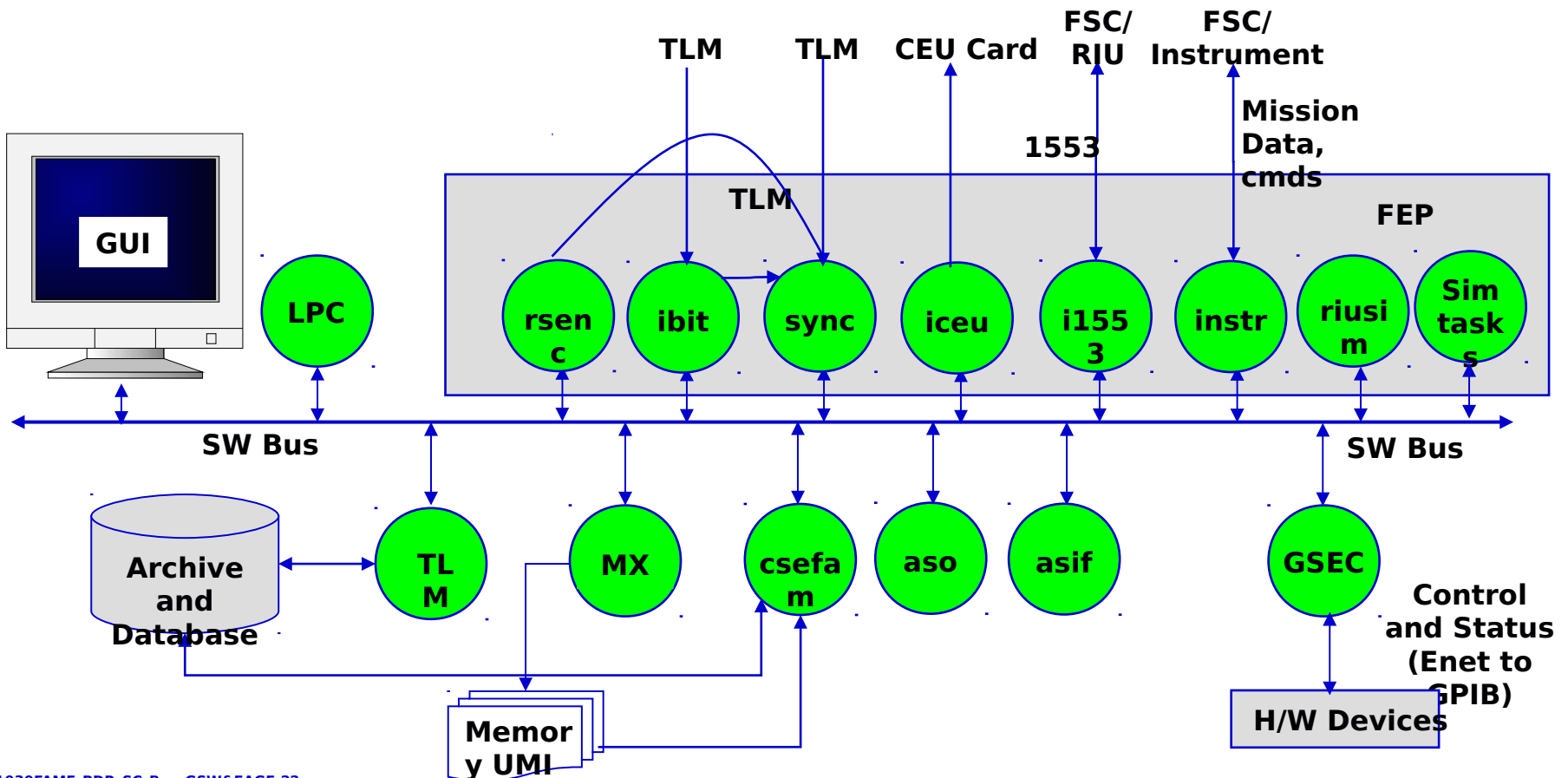
- **Complete Automation - Complete Control/Insight**
- **System Shall Use a Sun Solaris Platform for C&T Using NRL's OSComet**
- **Front-End Processor (FEP) Shall Be a VME Chassis Running the VxWorks OS**
- **Housekeeping Telemetry and Commands Are Passed Via 100 Mb Ethernet Between the FEP and the C&T Nodes**
- **SW Interfaces Use CCSDS Application Packet Format**
- **All C&T Data Is Archived on the FEP As Well As the Sun**
- **Software Shall Be Written in "C"**
- **Scripts Shall Be Written in csh, sh, tcl, or perl**
- **Code Re-Use Is the Key to Productivity (ICM, WINDSAT, NEMO, BP)**
- **The LAN for Formal Testing Shall Be Isolated From the NRLnet**
- **Shall Support a Heterogeneous Network of Nodes for Off-Line Analysis (PCs and MACs Will Be Able to Mount Our File System to Analyze Data Offline)**
- **Physical Interfaces Shall Be Isolated From the Application Software via a Separate Executable or Threads (Ex. Commanding System and the CEU Handler, Payloadsim and the I1553 Task)**
- **System Shall Provide APIs to Isolate and Control**
- **WEB Browser Shall Be Supported Using ITOS**



# EAGE Ground SW Design



- 1. The Software Bus Allows Us to Configure Processing Components on Any Node in the LAN**
  - The Telemetry and Commands May Come From/Go to Any Interface (1553, CEU, Frame Sync, Instrument Data)
- 2. Interface Tasks (Ex. I1553) Handle All Hardware Specifics**
  - Simulation Tasks Control the Interface Tasks Via the Software Bus
  - Simulations Are Independent From the Physical Interfaces





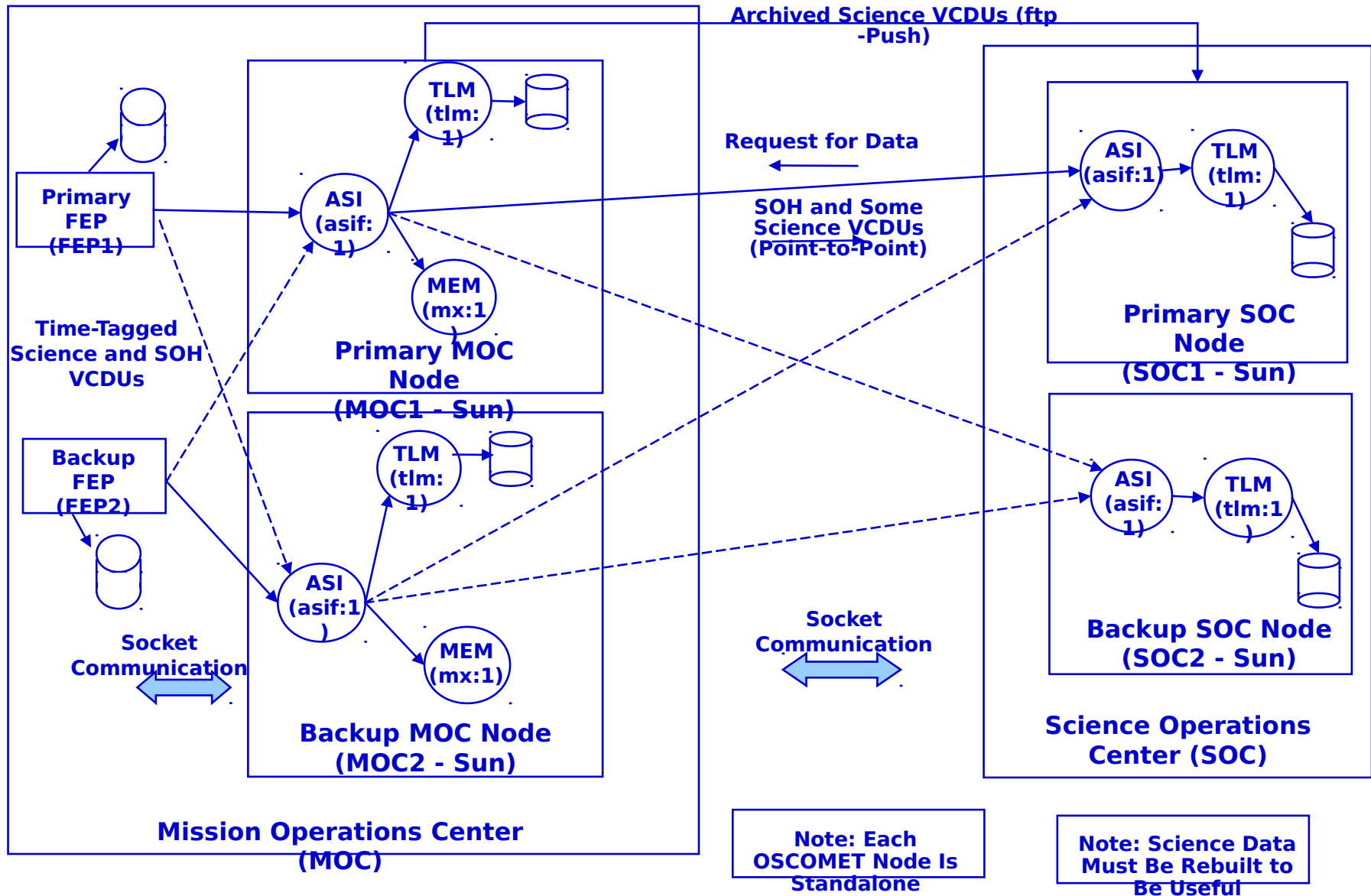
# C&T Design Approach



- **Provide a MOC/SOC Distributed Data System But Not a WAN Distributed OS/COMET Application**
- **Provide Redundancy Using a Simple Primary/Backup Approach**
- **Work With BP to Define Control Requests and Status Responses for Shared Ground Station Equipment (E.G. Antenna, Transmitter)**
- **Reuse Design and Code Fragments From ICM (E.G. TLMASI, TLMPRC) and WINDSAT/NEMO (e.g. asiw, cmd, ccscs) As Much As Possible**
- **Use Oracle DB to Store Command and Telemetry (CAT) Information**
  - **Data Items (Symbols), Packet Formats (Decom), Commands**
  - **Single Point Definition With Generation of Documentation, OS/COMET Databases, and C Code**
- **Provide Web-Based Near-Real Time Telemetry Display of High Level Status Using ITOS**
- **Provide Web-Based Historical Display of High Level Status Using Oracle DB and Oracle Portal**



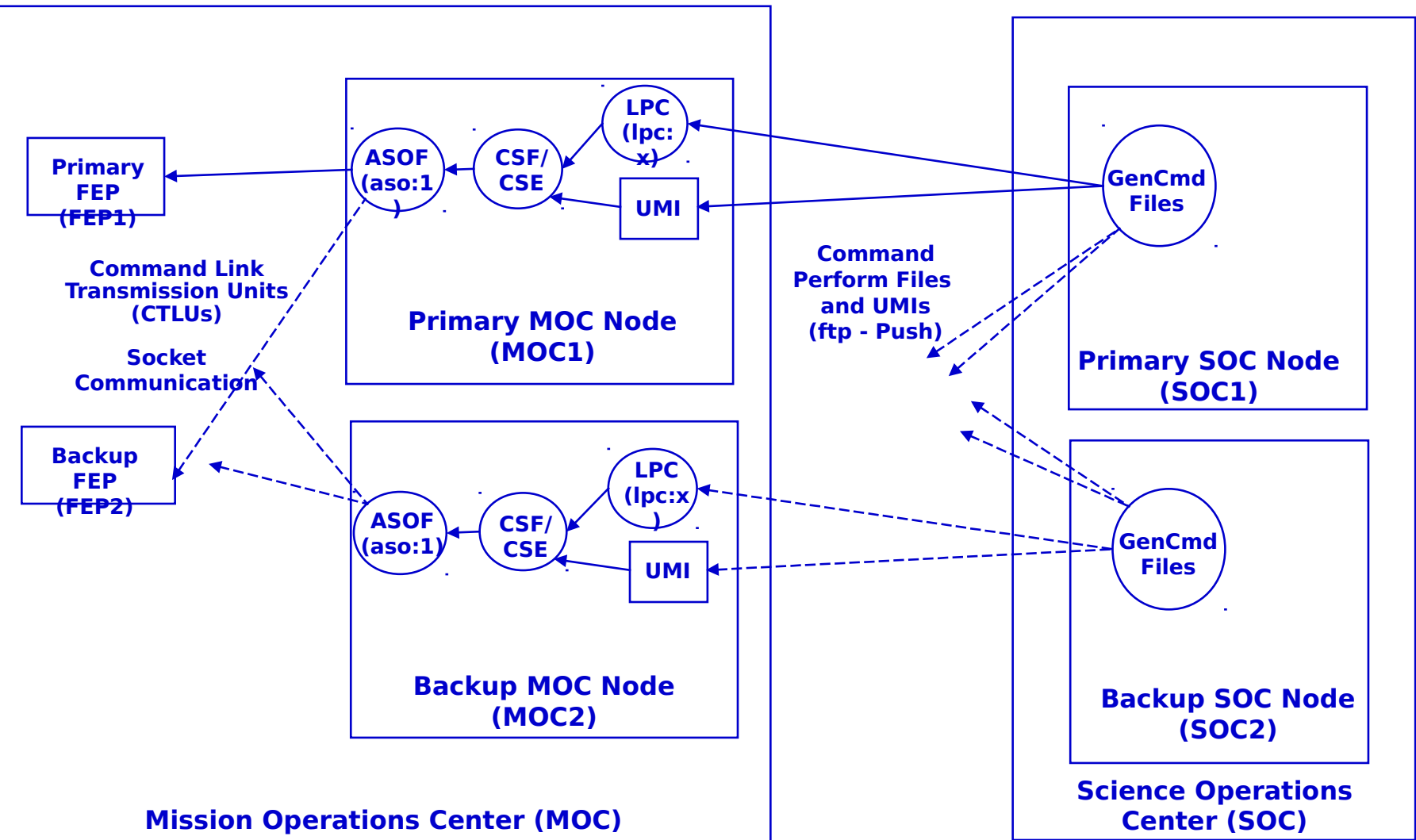
# Telemetry Distribution Design-TBR







# Commanding Design







# C&T Design Data Interfaces

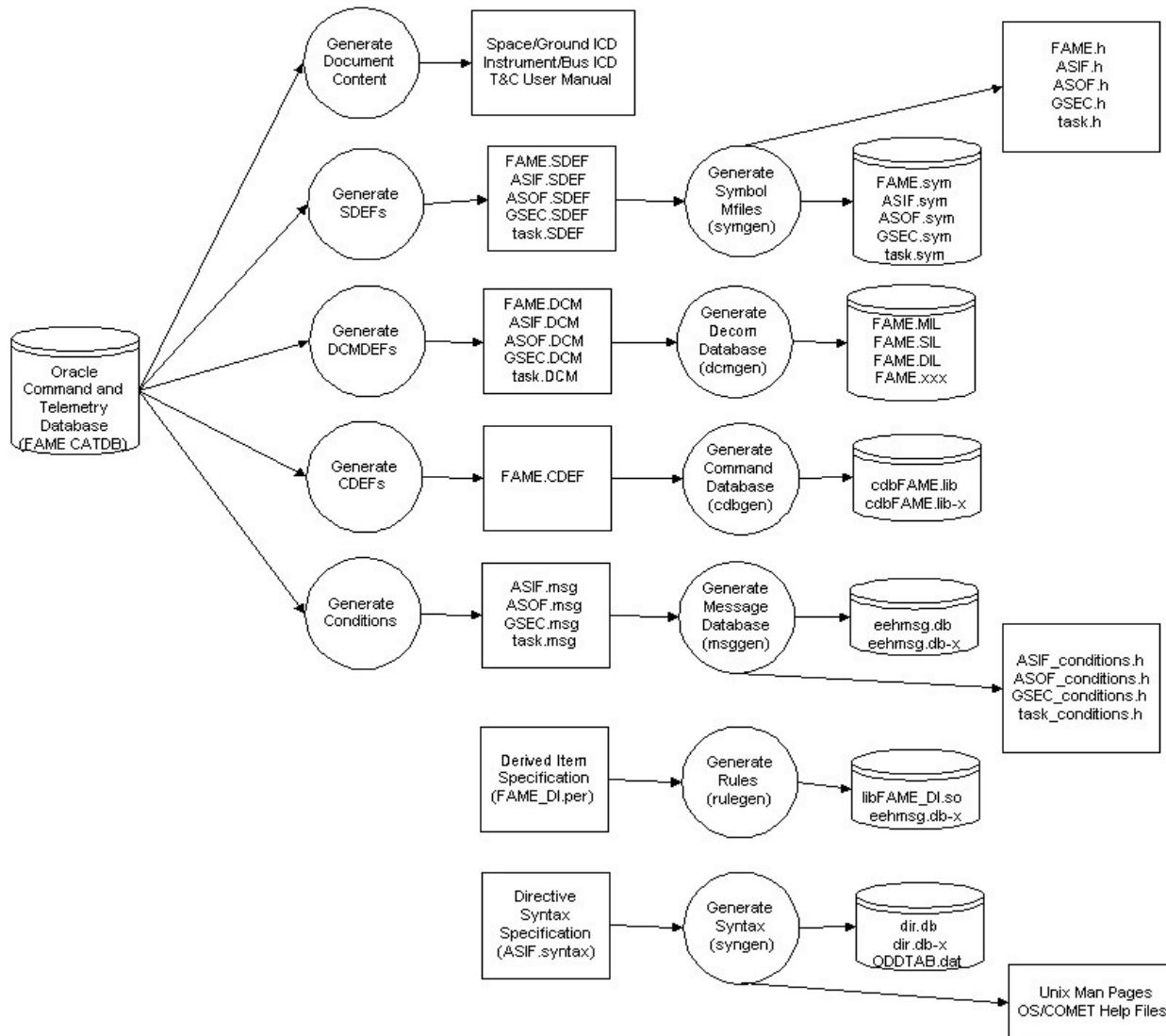


- **Between DSN and MOC - TBD**
- **Between MOC (i.e. BP) and SOC**
  - SOC to MOC - Science Tasking /Commanding in OSCOMET Perform Files
  - SOC to MOC - Request for Telemetry/Science VCDUs
  - MOC to SOC - Science VCDUs in OS/COMET Recording Files - FTP Push
  - MOC ASIF to SOC ASIF - Multicast Time-Tagged VCDUs Packaged in AppPkts
- **Between FAME FEP and NRL C&T/Control Node at MOC (TBR)**
  - Operations and Control (OAC) Node to FAME C&T Node
    - Control Perform File Execution (Setup, Shutdown, Ranging etc.)
  - FAME C&T Node to BP Control Nodes
    - Request to Use Hardware - (ex. Antenna Controller, Uplink Matrix)
- **Between FAME FEP and FAME C&T Nodes at MOC**
  - FEP to ASIF - Time-Tagged VCDUs Packaged in Application Packets (AppPkt)
  - ASOF to FEP - Command Link Transmission Units (CLTU)
- **Between FAME C&T Processes**
  - ASIF to TLM - Packaged Telemetry Messages (PTMs)
  - ASIF to MEM - Packaged Memory/Object Messages (PMMs, POMs)
  - CSF to ASOF - Packaged Command Messages (PCMs)
  - Misc Processes to ASIF - Statistics in AppPkts to Be Decommed



# C&T Design Processing Specification Tools

## FAME CAT Offline Specification

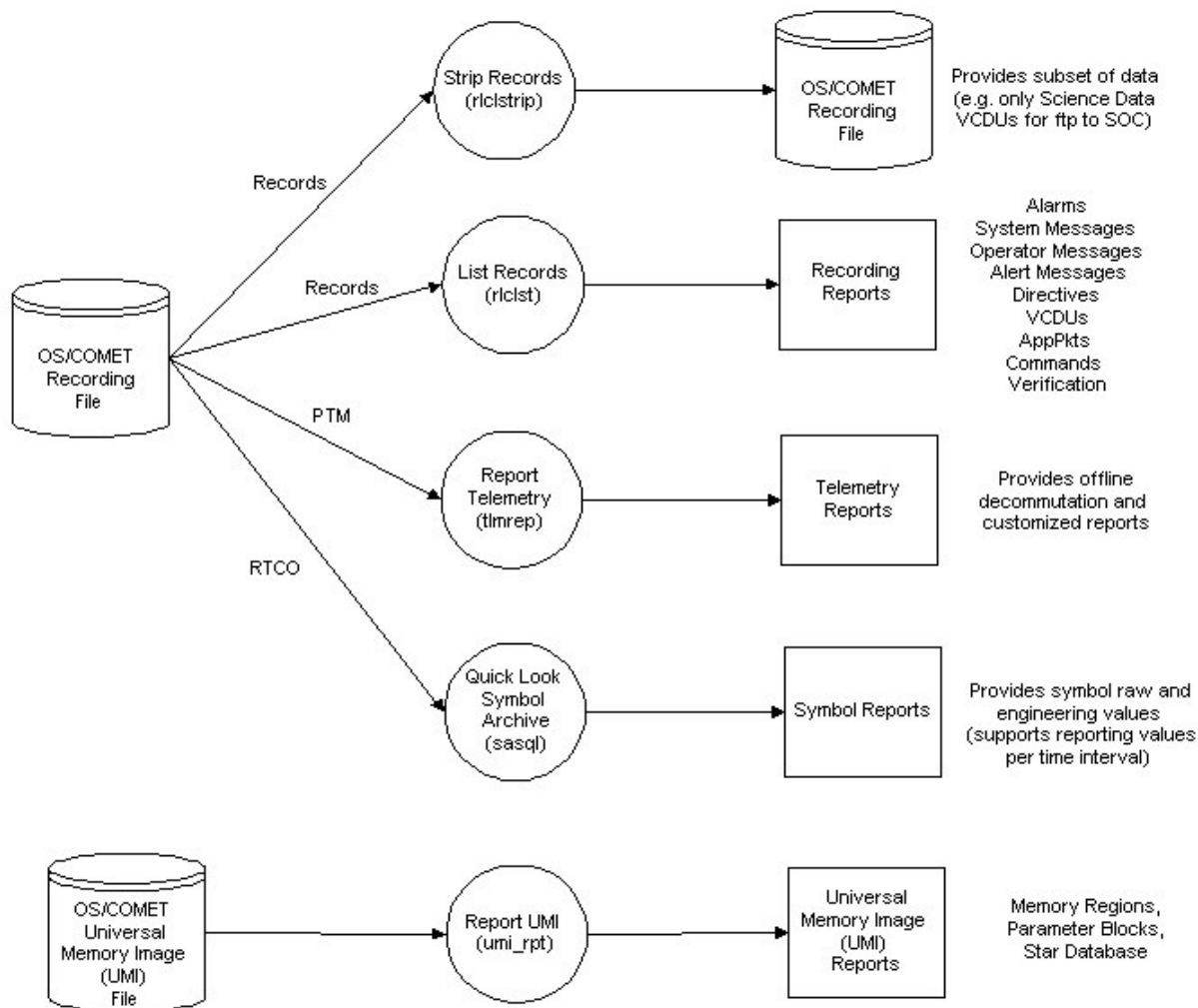




# C&T Design OS/COMET Offline Tools



## FAME CAT Offline Processing and Analysis





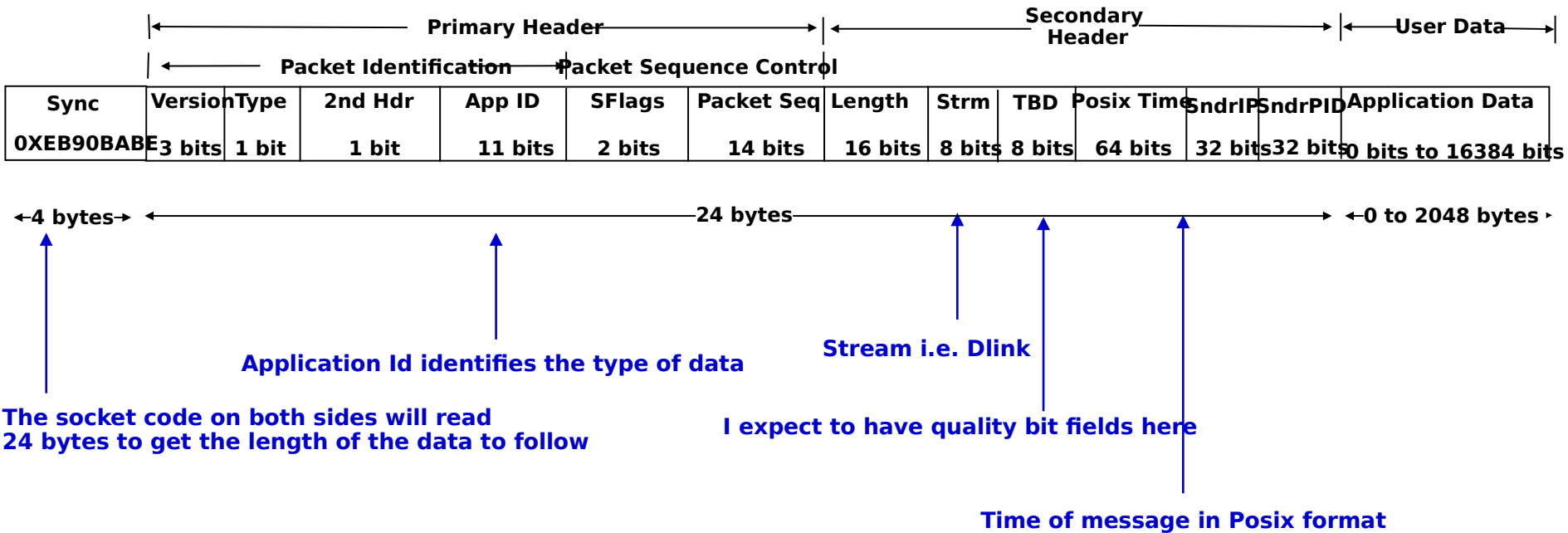
# FEP Design



- **All Control From OSComet Syntax With Defaults for FAME C&T**
- **FEP Will Boot From the Sun Host**
- **FEP Will Log Using Files on the Sun Host (i.e. NFS to Sun Disk)**
- **FEP Will Provide Browser Viewable Status Via the C&T System - Not From the FEP**
- **FEP Will Support Archive Within 18 Months - Format Will Be OSComet RCD Files**
- **Using CCSDS Application Packets As Method of Inter-Process Communication**
- **All FEP Tasks Will Probe the VME to See If Their Card Is in the Chassis**
- **The FEP Will Not Process the Packets Inside the VCDUs**
  - **This Will Be Done by the ASI on the Sun Nodes**
  - **The FEP Will Frame Sync, Derandomize, RS Check and Time Assign**
- **Time Assignment to Be Done As Follows:**
  - **Gather "Base Time" in Us From GPS Time Card Before You Start Collecting Frames**
  - **Init the Frame Sync Card Which Uses the 33.333MHz PCI Clock to Count Ticks (Set Count to Zero)**
  - **The Card Also Supports an External Clock - We Will Use This During Operations**
  - **Sync Card Reports It's Clock (i.e. Counter) With Each Frame - Last Bit of Frame**



# FEP Socket/Message Interface



All inter-task messages on the FEP will use this format (minus the sync pattern)



# Telemetry Stats



Commander Session 1: tlmasi\_stat

File Display Construct Options Help

Flt TBD TLMASI Statistics Gnd 17-OCT-01 14:06:23

Frame Statistics		tlmasi 11 Running		Tlm Collection: On	
		Errors		Telemetry: Locked	
Read: 11482		Hdr: 0	VCDU Hdr: 0	Seq Cnt: 23	Science to PRC: Enable
Valid: 11482		Size: 0	VCDU CRC: 0	VCDU Seq: 23	Quality Factor: 100.000%
Reject: 0		Sync: 0	FEP RS: 0	CADU Seq: 0	Sequenc Quality: 100.000%
To SOC: 0			FEP FS: 0	FEP Seq: 0	Recording: Off
To PRC: 11482					Tlm Source: Socket
Lock Lost: 0					Socket Port: 7553
Time Statistics		Virtual Chans		Send to SOC: Off	
Flight: None		1 2 3 4		Debug Level: Brief file	
		5 6 7 8		Store Frames: False	
		9 10 11 12		Timeout Secs: 2	
		63		FSW Interface: Disable	
FEP Time: 14:06:23.244				Recording-file Name	
FEP Base Time: 00:00:00.000					
FEP Offset Time: 14:06:23.244					

Lock MF:0011482 VCID:9 VCDU:0011489 VY.MIL

Source: AT:TLM\_FRAMES\_1... Mode: OS/COMET PSA:Closed Time: Oct 17 2001 14:06:23  
Op Msg: COMMAND TRANSMISSION COMPLETE: NOOP - No Operation  
Perform: ENDFIL tlmcrf.per 0 [End Of File]  
Alert:

Command: I Interrupt





# Raw Telemetry Frame



Commander Session 1: tlm\_pkt

File Display Construct Options Help

Flt TBD Telemetry Packets Gnd 17-OCT-01 14:07:21

Tlm Application Packet Header

Ver	Type	Sec Header	App ID	Seq Flags	Seq Count	Pkt Length	Clock Counts	App SubID	Status	Spare
0	Tlm	Present	0x31E	Only	00047	423	012062	0	Fresh	00

Raw Application Data (up to 264 bytes)

```
3839 3A3B 3C3D 3E3F 4041 4243 4445 4647 4849 4A4B 4C4D 4E4F
5051 5253 5455 5657 5859 5A5B 5C5D 5E5F 6061 6263 6465 6667
6869 6A6B 6C6D 6E6F 7071 7273 7475 7677 7879 7A7B 7C7D 7E7F
8081 8283 8485 8687 8889 8A8B 8C8D 8E8F 9091 9293 9495 9697
9899 9A9B 9C9D 9E9F A0A1 A2A3 A4A5 A6A7 A8A9 AAAB ACAD AEA
F
B0B1 B2B3 B4B5 B6B7 B8B9 BABB BCB D BEBF C0C1 C2C3 C4C5 C6C7
C8C9 CACB C C C D CECF D0D1 D2D3 D4D5 D6D7 D8D9 DADB DCDD DEDF
E0E1 E2E3 E4E5 E6E7 E8E9 EAEB ECED EEEF F0F1 F2F3 F4F5 F6F7
F8F9 FAFB FCFD FEFF 0001 0203 0405 0607 0809 0A0B 0C0D 0E0F
1011 1213 1415 1617 1819 1A1B 1C1D 1E1F 2021 2223 2425 2627
2829 2A2B 2C2D 2E2F 3031 3233 3435 3637 3839 3A3B 3C3D 3E3F
```

Lock MF:0012062 VCID:9 VCDU:0012062 VV:MLL

Source: AT:TLM\_FRAMES\_1,... Mode: OS/COMET PSA:Closed Time: Oct 17 2001 14:07:21  
Op Msg: COMMAND TRANSMISSION COMPLETE: NOOP - No Operation  
Perform: ENDFIL tlmcr.t.per 0 [End Of File]  
Alert:

Command: I Interrupt



# Raw Command



Commander Session 1: ctf\_view

File Display Construct Options Help

Flt TBD Command Transport Frames Gnd 17-OCT-01 14:08:58

CTF Fields		Critical Cmd
Type:	FSW Command	Crit Cmd Id: 0
Sync:	FAF320	
Path:	07	FSW Cmd Packet
Version:	0	Version: 0
Bypass:	Norm	Type: Cmd
Control Cmd	Norm	Scndy Hdr Flag: Present
Spare 1:	0	App Proc Id: 0x0C
Sat Id:	0x8A	Sequence Flags: Only
Spare 2:	0	Sequence Count: 0
Crit Cmd:	Norm	Packet Length: 3
Frame Length:	15	Command Id: 0x4E
Frame Sequence:	49859	Command SubId: 0
		Checksum: D9F1

FSW Cmd Packet Application Data (up to 96 bytes)

```
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

Lock MF:0013032 VCID:9 VCDU:0013039 VY.MIL

Source: AT:TLM\_FRAMES\_1,... Mode: OS/COMETPSA:Closed Time: Oct 17 2001 14:08:58  
Op Msg: COMMAND TRANSMISSION COMPLETE: NOOP - No Operation  
Perform: ENDFIL tlmcrct.per 0 [End Of File]  
Alert:

Command: I Interrupt



# FEP SWB Status



Commander Session 1: fepstats

File Display Construct Options Help

FAME9 fepstats 19-OCT-01 19:17:05

Count:	333	Timer:	2	FepName:	famefep2			
Sent	QID	Messages	Bytes	lap	Errors	B/sec	Peak	Errno
tEnetMon	016F5CD8	12	1258	070	0	0	563	00000000
tEnetRead	01667868	1	134	051	0	0	67	003D0004
tEnetWrt	01132F08	0	0	000	0	0	0	00000000
tVMEacces	010A9670	3	236	010	0	0	47	00000000
tLooptask	0101FDD8	3	235	010	0	0	47	00000000
tTesttime	00F96540	342	35568	035	0	52	166	00000000
tFrameSyn	00F0CCA8	24779	13987571	061	0	69296	70432	00000000
tRSENCtas	00E7D830	236	29221	051	0	0	2046	00000000
tBusWrt	00DF3F98	681	60149	094	0	88	378	003D0002
tCEU	00D6A700	4	266	010	0	0	53	00000000
Rcvd	QID	Messages	Bytes	lap	Errors	B/sec	Peak	
tEnetMon	016F5CD8	0	0	000	0	0	0	
tEnetRead	01667868	0	0	000	0	0	0	
tEnetWrt	01132F08	38188	17958528	061	0	75263	76289	
tVMEacces	010A9670	0	0	000	0	0	0	
tLooptask	0101FDD8	0	0	000	0	0	0	
tTesttime	00F96540	0	0	000	0	0	0	
tFrameSyn	00F0CCA8	0	0	000	0	0	0	
tRSENCtas	00E7D830	3	132	070	0	0	22	
tBusWrt	00DF3F98	1	430	091	0	0	86	
tCEU	00D6A700	0	0	000	0	0	0	

Source: AT:FAME Mode: OS/COMET PSA:Closed Time: Oct 19 2001 19:17:05

Op Msg: I- FMGR Directive processed successfully.

Perform: ENDFIL fep\_setup. 0 [End Of File]

Alert:

Command: I

Interrupt



# FEP Frame Sync Status



Commander Session 1: fepsync

File Display Construct Options Help

**FAME9** fepsync 19-OCT-01 19:16:41

Setup: 19:05:45.333	SyncH: 1ACFFC1D	SyncL: 00000000
Active: YES	MaskH: FFFFFFFF	MaskL: 00000000
RSTAT0: 0320 RSTAT1: 6620	FrameLen: 512	
StatCnt: 650	Slip_Window: 0	
FrameCnt: 21906	Sync_Errors: 0	
Overrun: 0	Check_Frames: 0	
Dropout: 2	Flywheel_Frames: 0	
Winend: 21906	Input_Code: NRZL	
Lock Intrpts: 3	Word_Order: FORWARD	
CRCErr: 0	Bit_Order: MSB	
FramesPerSec: 124	Data_Invert: NO	
BitsPerSec: 507904	Polarity_Correct: YES	
FrameSyncQA: 1	Clock_Invert: NO	
SyncErrsQA: 0	RS_Enable: YES	
CrcErrsQA: 0	RS_Offset: 4	
DropOutQA: 0	RS_InterleaveDept: 2	
BitSlipsQA: 0	CRC_Enable: NO CRC_Mode: NO	
TimeStampQA: 00000001 457DD897	Randomize_Enable: YES VCID=0x63: YES	
FrameSyncQAFlags: 0000000F	Quality_Annotation: ADD IncludeRS: YES	
SICC APC CLK RSEC_IRQ R_I IEF IHF IFF IOVRN OEF OHF OFF IOVRN		
LOCK NO YES NO NO EMPTY NOT NOT OK EMPTY NOT NOT OK		
Ver Ty 2nd AppID sFlgs seqCnt pktLen stm secs nsecs sendIP sendPID		
0 TLM 1 063 03 028A 139 97 39EDF718 27976930 84FAACBE 00CE0C50		

Source: AT:FAME Mode: OS/COMET PSA:Closed Time: Oct 19 2001 19:16:41

Op Msg: I- FMGR Directive processed successfully.

Perform: ENDFIL fep\_setup. 0 [End Of File]

Alert:

Command: I Interrupt



# FEP Socket Statistics



Commander Session 1: fepsocket

File Display Construct Options Help

FAME9 fepsocket 19-OCT-01 19:17:47

Msgs	Bytes	Errors	B/sec	Peak	
43866	21263299	0	75719	76863	- Sent 0: CONNECT
0	0	0	0	0	- Sent 1: WAITING
0	0	0	0	0	- Sent 2: WAITING
0	0	0	0	0	- Sent 3: WAITING
0	0	0	0	0	- Sent 4: WAITING
4	184	0	0	24	- Received client 0
0	0	0	0	0	- Received client 1
0	0	0	0	0	- Received client 2
0	0	0	0	0	- Received client 3
0	0	0	0	0	- Received client 4

	AppId	Length	IP		AppId	Length	IP
19:17:44.833	65 0x41	1992	84FAACBE	19:16:30.964	1120x70	44	80BC4200
19:17:44.823	97 0x61	568	84FAACBE	19:09:39.594	1120x70	44	80BC4200
19:17:44.822	97 0x61	568	84FAACBE	19:09:01.482	1120x70	44	80BC4200
19:17:44.806	97 0x61	568	84FAACBE	19:05:56.090	68 0x44	36	80BC4200
19:17:44.806	97 0x61	568	84FAACBE	00:00:00.000	0 0x00	0	00000000
19:17:44.790	97 0x61	568	84FAACBE	00:00:00.000	0 0x00	0	00000000
19:17:44.790	97 0x61	568	84FAACBE	00:00:00.000	0 0x00	0	00000000
19:17:44.773	97 0x61	568	84FAACBE	00:00:00.000	0 0x00	0	00000000
19:17:44.773	97 0x61	568	84FAACBE	00:00:00.000	0 0x00	0	00000000

Ver	Ty	2nd	AppID	sFlgs	seqCnt	pktLen	stm	secs	nsecs	sendIP	sendPID
0	TLM	1	043	03	0163	645	255	39EDF758	31AA2570	84FAACBE	00CE0C50

Source: AT:FAME Mode: OS/COMET PSA:Closed Time: Oct 19 2001 19:17:48  
Op Msg: I- FMGR Directive processed successfully.  
Perform: ENDFIL fep\_setup. 0 [End Of File]  
Alert:

Command:  Interrupt



# FEP VME Statistics



Commander Session 1: fepvmestats1

File Display Construct Options Help

FAME9 fepvmestats1 16-OCT-01 21:02:30

	WRITE	Bytes	Errors	DMA	Address	B/sec	Peak
tCEU		28	0	0	C7000020	0	14
t1553test		0	0	0	00000000	0	0
tStattask		0	0	0	00000000	0	0
tUDMtask		0	0	0	00000000	0	0
tFSC1553t		1089196	0	0	C1004100	560	838
NoTASK		0	0	0	00000000	0	0
NoTASK		0	0	0	00000000	0	0
NoTASK		0	0	0	00000000	0	0
NoTASK		0	0	0	00000000	0	0
	READ	Bytes	Errors	DMA	Address	B/sec	Peak
tCEU		4	0	0	C7000000	0	2
t1553test		0	0	0	00000000	0	0
tStattask		149016	0	0	C1004100	76	104
tUDMtask		0	4	0	C0004008	0	0
tFSC1553t		505452	0	0	C1004100	260	266
NoTASK		0	0	0	00000000	0	0
NoTASK		0	0	0	00000000	0	0
NoTASK		0	0	0	00000000	0	0
NoTASK		0	0	0	00000000	0	0

Ver Ty 2nd AppID sFlgs seqCnt pktLen stm secs nsecs sendIP sendPID  
0 TLM 1 045 03 03D4 977 255 39EA1B65 2AE8F55C 84FAACBE 00CE0C5C

Source: AT:FAME Mode: OS/COMET PSA:Closed Time: Oct 16 2001 21:02:28  
Op Msg: I- FMGR Directive processed successfully.  
Perform: ENDFIL fep\_setup. 0 [End Of File]  
Alert:

Command: I Interrupt



# FEP CEU



Commander Session 1: fepceu

File Display Construct Options Help

FAME9 fepceu 16-OCT-01 21:06:30

Stat Count	IDreg	FTMIreg	SETUP QDACreg	enableEcho
1101	00030001	00000020	00000062	YES
Cmnds Sent	UTILreg	FRGreg	rate index	enableRcv
2	FFFFFFFF	FFFFFF40	F8	NO
Cmnds Pending	QDACreg	FRSreg	X100	
0	FFFFFFFF	FFFFFF22	NO	
Bytes Sent	IEVreg	FRBreg	idle	
108	000FFF50	FFFFF000	MIXED	
Bytes Pending	FTCreg	intrCmndsSent	output	
0	FFF8F3F5	2	ON	
Cmnds Rcvd	FTSreg	intrCmndsRcvd	minIdle	
0	FFFFFF11	0	32	
Errors	FTBreg	intrXmitOver	clkEdge	
0	FFFFF000	0	RISING	
		intrXmitUnder	revSrc	
		0	RS422	
			m21	
			NRZM_NRZL	

Ver	Ty	2nd	AppID	sFlgs	seqCnt	pktLen	stm	secs	nsecs	sendIP	sendPID
0	TLM	1	081	03	044D	153	97	39EA1C56	1658AD1C	84FAACBE	00CE0C50

Source: AT:FAME Mode: OS/COMET PSA:Closed Time: Oct 16 2001 21:06:31

Op Msg: I- FMGR Directive processed successfully.

Perform: ENDFIL fep\_setup. 0 [End Of File]

Alert:

Command: I

Interrupt



# FSC 1553 Board Testing



Commander Session 1: fepfsc1553

File Display Construct Options Help

FAME9 fepfsc1553 16-OCT-01 21:05:11

last received data StatCnt: 2123

00 00 BE CF 00 00 BE D0 00 00 BE D1 00 00 BE D2	000-00F	lastRTwrt:	0
00 00 BE D3 00 00 BE D4 00 00 BE D5 00 00 BE D6	010-01F	cmdsSent:	2104
00 00 BE D7 00 00 BE D8 00 00 BE D9 00 00 BE DA	020-02F	bytesSent:	134656
00 00 BE DB 00 00 BE DC 00 00 BE DD 00 00 BE DE	030-03F	lastRTread:	0
00 00 CF 0F 00 00 CF 10 00 00 CF 11 00 00 CF 12	040-04F	msgsRcvd:	2104
00 00 CF 13 00 00 CF 14 00 00 CF 15 00 00 CF 16	050-05F	bytesRcvd:	134656
00 00 CF 17 00 00 CF 18 00 00 CF 19 00 00 CF 1A	060-06F	intrRcvd:	0
00 00 CF 1B 00 00 CF 1C 00 00 CF 1D 00 00 CF 1E	070-07F		

intrMaskReg: FFFFFFFC0	SctrlReg	reg0: FFFF8002
intrStatReg: FFFFFFFC0	SOpStatReg	reg1: FFFF044B
intrAckReg: 00000000	SCurCmdReg	reg2: FFFF0820
intrEvtReg: FFFFFFFC0	SIntMaskReg	reg3: FFFFFFFF
SBrdCtlReg: 40004140	SPendIntReg	reg4: FFFF0002
	SIntPtrReg	reg5: FFFF2202
	SBitWrdReg	reg6: FFFF0000
	STimerReg	reg7: FFFF0000
	SCmdPtrReg	reg8: FFFF2118
	SCmdCntReg	regA: FFFF0000

Ver	Ty	2nd	AppID	sFlgs	seqCnt	pktLen	stm	secs	nsecs	sendIP	sendPID
0	TLM	1	0F3	03	084B	241	97	39EA1C07	08C1AC1C	84FAACBE	00CE0C50

Source: AT:FAME Mode: OS/COMET PSA:Closed Time: Oct 16 2001 21:05:11

Op Msg: I- FMGR Directive processed successfully.

Perform: ENDFIL fep\_setup. 0 [End Of File]

Alert:

Command: I Interrupt





# FSC Test Bed Parts



## FSC Testbed (FTB) - Delivery Date 2001/10

Item	Supplier	Serial/Part #	Status	Delivery Date	Unit Price	Comments
<b>Sparc Ultra 2 CPU</b>	Sun	003H2BC8	in T970	6/01	Available	fameds9, Includes Mouse, Keyboard
<b>Sun Monitor</b>	Sun	0010968-516	in T970	6/01	Available	for fameds9
<b>8mm Tape Drive</b>	Sun	004C0276	in T970	6/01	Available	for fameds9
<b>3Com Switch 3300</b>	3Com		in T970	6/01	\$1,500	The One We Have Is in Melbourne Being Used By EK
<b>Best Power Fortress</b>	Best	1425UG01014	in T970	6/01	Available	
<b>GPS Time Display</b>	TrueTime	99234644	in T970	6/01	Available	
<b>Natl Inst GPIB-Enet</b>	Natl Inst	B8D617	in T970	6/01	Available	To Control HP 6032
<b>VME Chassis</b>	-		in T970	6/01	Available	
<b>SEI VCEU</b>	Silver			8/01	Available	Silver Engineering VME Command Encoder Unit
<b>Avtec RSDEC</b>	Avtec		in T970	6/01	Available	Avtec Systems VME Framesync Card
<b>SBS Power 4E</b>	SBS		in T970	6/01	Available	300 MHz CPU With 256 Mb RAM
<b>SBS 1553</b>	SBS		in T970	6/01	Available	SBS VME 1553 Interface Card
<b>SEI Instrument sim</b>	Silver			11/01	15000 est.	
<b>Datum Timer bc366</b>	Datum		in T970	6/01	Available	Datum VME Timer Card bc366
<b>SEI IMU, sun sensors</b>	Silver/NRL				10000 est.	
<b>Gimi ACS Box</b>				9/01	Available	
<b>HP 6032A Pwr</b>	HP	US38322386	in T970	6/01	Available	
<b>SEI BPU</b>	Silver			6/01	Available	Silver Engineering Bus Protection Unit
<b>I/O Panel FTB</b>					1000 est.	Not Required for Initial Testing



# Software Test Bed Parts



## Software Testbed (STB) - Delivery Date 2001/11

Item	Supplier	Serial/Part #	Status	Delivery Date	Unit Price	Comments
Sparc Ultra 2 CPU	Sun	003H29AC	in T970	6/01	Available	fameds8, Includes Mouse, Keyboard
Sun Monitor	Sun	0010968-518	in T970	6/01	Available	fameds8
3Com Switch 3300	3Com			6/01	\$1,500	We can use an existing Hub
Best Power Fortress UPS	Best	1425UG01013	in T970	6/01	Available	
GPS Time Display	TrueTime			11/01		
Natl Inst GPIB-Enet	Natl Inst	AD5DE0	in T970	6/01	Available	to control HP 6032
VME Chassis	-		in T970	6/01	Available	
SEI VCEU	Silver			8/01	Available	Silver Engineering VME Command Encoder Unit
Avtec RSDEC	Avtec		in T970	6/01	Available	Avtec Sytems VME Framesync Card
SBS Power 7E	SBS		in T970	6/01	Available	
SBS 1553	SBS		in T970	6/01	Available	SBS VME 1553 Interface Card
SEI Instrument sim	Silver			11/01	15000 est.	
Datum Timer bc366	Datum		in T970	6/01	Available	Datum VME Timer Card bc366
SEI IMU, Sun Sensors etc	Silver/NRL			11/01	10000 est.	
Gimi ACS box						
HP 6032A Pwr Supply	HP	US38322380	in T970	6/01	Available	
SEI BPU	Silver			6/01	Available	
I/O Panel STB	-				1000 est.	



# EAGE Parts



## ***EAGE - Delivery Date 2002/06***

<b>Item</b>	<b>Supplier</b>	<b>Serial/Part #</b>	<b>Status</b>	<b>Delivery Date</b>	<b>Unit Price</b>	<b>Comments</b>
<b>Sun Ultra 2 - EAGE</b>	Sun					Maybe Acquire W/Out Buying
<b>Sun Monitor</b>	Sun					Maybe Acquire W/Out Buying
<b>3Com Switch 3300</b>	3Com			6/02	\$1,500	
<b>Best Power Fortress UPS</b>	Best			6/02		I would Get a Rack Mountable UPS for This (NEMO)
<b>GPS Time Display</b>	TrueTime			6/02		
<b>Nat'l Inst GPIB-Enet</b>	Nat'l Inst			6/02		to Control HP 6032, Other 488 Devices
<b>VME Chassis</b>	-		in T970	6/01	Available	
<b>SEI VCEU</b>	Silver			6/02	15000 est.	Silver Engineering VME Command Encoder Unit
<b>Avtec RSDEC</b>	Avtec		in T970	6/01	Available	Avtec Systems VME Framesync Card
<b>SBS Power 7E</b>	SBS		in T970	6/01	Available	
<b>SBS 1553</b>	SBS			6/02		SBS VME 1553 Interface Card
<b>SEI Instrument sim</b>	Silver			6/02	15000 est.	
<b>Datum Timer bc366</b>	Datum		in T970	6/01	Available	Datum VME Timer Card bc366
<b>SEI IMU, Sun Sensors etc</b>	Silver/NRL			6/02	10000 est.	
<b>Gimi ACS Box</b>						
<b>HP 6032A Pwr Supply</b>	HP		in T970	6/01	Available	
<b>SEI BPU</b>	Silver			6/02		Silver Engineering Bus Protection Unit
<b>I/O panel EAGE</b>				6/02		
<b>HP 6032A Pwr Supply</b>				6/02		
<b>SEI BPU</b>				6/02		Silver Engineering Bus Protection Unit
<b>APC UPS 3000RM</b>			in T970	6/01	Available	
<b>Battery Sim</b>			in T970	6/01	Available	Kepco BOP 36-12M
<b>Solar Array Sim</b>			in T970	6/01	Available	HP E4350B
<b>GD Rack Slides</b>	Newark	C-230-S-124				
<b>GD Rack Brackets</b>	Newark	CLB-307				
<b>Battery Sim</b>						Kepco BOP 36-12M
<b>Solar Array Sim</b>						HP E4350B
<b>BPU</b>						
<b>UPS</b>						



# ELSE Parts



<b>ELSE - Delivery Date 2004/01</b>						
<b>Item</b>	<b>Supplier</b>	<b>Part #</b>	<b>Status</b>	<b>Delivery Date</b>	<b>Unit Price</b>	<b>Comments</b>
<b>Sun Ultra 2 - EAGE</b>	Sun					Maybe Acquire W/Out Buying
<b>Sun Monitor</b>	Sun					Maybe Acquire W/Out Buying
<b>8mm Tape Drive</b>	Sun			6/01		
<b>3Com Switch 3300</b>	3Com			6/01		
<b>Best Power Fortress</b>	Best			6/01		
<b>GPS Time Display</b>	TrueTime			6/01		
<b>Nat'l Inst GPIB-Enet</b>	Nat'l Inst			6/01		to Control HP 6032, Other 488 Devices
<b>VME Chassis</b>	-			6/01		
<b>SEI VCEU</b>	Silver			7/01	\$15,000	Silver Engineering VME Command Encoder Unit
<b>Avtec RSDEC</b>	Avtect		in T970	6/01	Available	Avtec Sytems VME Framesync Card
<b>SBS Power 7E</b>	SBS			6/01		
<b>Datum Timer bc366</b>	Datun			6/01		Datum VME Timer Card bc366
<b>HP 6032A Pwr</b>				6/01		
<b>SEI BPU</b>	Silver			6/01		Silver Engineering Bus Protection Unit
<b>I/O Panel EAGE</b>						
<b>HP 6032A Pwr</b>			in T970	6/01	Available	
<b>SEI BPU</b>			in T970	6/01	Available	Silver Engineering Bus Protection Unit
<b>APC UPS 3000RM</b>			in T970	6/01	Available	
<b>Battery Sim</b>			in T970	6/01	Available	Kepco BOP 36-12M
<b>Solar Array Sim</b>			in T970	6/01	Available	HP E4350B
<b>GD Rack Slides</b>	Newark	C-230-S-124				
<b>GD Rack Brackets</b>	Newark	CLB-307				
<b>Battery Sim</b>						Kepco BOP 36-12M
<b>Solar Array Sim</b>						HP E4350B
<b>BPU</b>						
<b>UPS</b>						
<b>Rackmount Monitor</b>			in T970	6/01	Available	
<b>~20U Shipping Rack</b>			in T970	6/01	Available	
<b>~10U Shipping Rack</b>			in T970	6/01	Available	



# FSC Test Bed Needed Hardware



- **SEI Instrument Sim Card (Has All Instrument Interfaces)**
- **ARC I/F Sim Card - Available With FSC ARC Card**
- **Pass-1000 1553 Analyzer - Taking From ICM**
- **UPS Power for the Racks**
- **Various Cables**
- **BOBs**



# IV&V Status



- **BP Will Provide IV&V**
  - **BP Is Providing the Support**
  - **This Will Facilitate the Transition From I&T to EE&C and Operations**
- **Approach**
  - **BP and FAME I&T Will Create a MOA, BP Will Provide:**
    - **Review the Design and All Documentation**
    - **Review the Design and Code**
    - **Reports for Mark Johnson Prior to System Milestones (CDR, TRR etc.)**
  - **BP Will Provide up to 6 Weeks of Support Through FAME CDR**
- **Scope**
  - **BP IV&V Will Only Provide Coverage for Ground Software Efforts**